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Title: Decontamination and Decommissioning of a ^{238}Pu Processing Facility

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Decontamination and Decommissioning of a ^{238}Pu Processing Facility

Technical Area 55 (TA-55) at Los Alamos has been in operation since 1978. During those twenty years we have supported DOE programs in the area of ^{238}Pu heat source development, fabrication, and testing. The natural decay of ^{238}Pu generates approximately a half watt of thermal energy per gram of isotope. Its relatively long half-life (88 years) yields predictable power levels over long periods, making this isotope suitable for missions in deep space. The heat from ^{238}Pu decay is converted to electricity to run equipment and to heat critical equipment in the cold environment in outer space.

An undesirable effect of the high alpha activity of ^{238}Pu is the accelerated degradation of equipment from heat and radiolysis. At Los Alamos, we are in the process of removing and replacing the gloveboxes and supporting equipment that have been used for past heat source production, and that has reached the end of its useful lifetime.

Scope of Glovebox and Equipment Replacement

The scope of glovebox and equipment replacement includes removing and replacing all equipment where oxide powder is processed to granules for pellets. Equipment being replaced includes gloveboxes, furnaces, and cold presses. An additional challenge to the successful completion of the work is the necessity to maintain the capability to fabricate heat sources while the replacement work is underway.

Preparation

Preparation for the glovebox removal includes clearing the gloveboxes of all equipment including furnaces. All utilities - gas lines, electrical lines, and water lines - must also be disconnected and removed from the glovebox.

The next major step is to erect an area tent contamination control.

Gloveboxes to be removed must be contained within the tent; in addition adequate room must be maintained for personnel to work inside. Added on to the tent was a smaller room known as the airlock or step off area.

After the erection of the tent we disconnected the glovebox from the ventilation. Personnel included two Radiologic Control

Technicians (RCT), two operating group personnel, and four pipefitters from the site craft workers. Temporary flex hoses were used to replace the existing ventilation lines. Once the gloveboxes were removed from the ventilation lines the te bubblers," pressure relief devices that ensure the

glovebox pressure remains negative with respect to the laboratory while maintaining an inert atmosphere, were taken off and the glovebox penetration sealed.. Prior to removal all oil had been drained. Before the gloveboxes could be packaged for removal from the room, the RCT's performed dry swipes on the external surfaces of the gloveboxes to make sure that there was no detectable contamination. Once it was determined that no removable contamination remained, both gloveboxes were wrapped with a cellophane type material and a heavier plastic as well.

Contamination Control during Removal

As mentioned above, a tent was erected to limit room contamination in the event of a release. Personnel protective equipment required for the glovebox removal included wearing cloth coveralls, Tyvek coveralls worn over the cloth coveralls, two or more pair of booties (shoe coverings), two or more pair of rubber gloves, a Tyvek hood, and full-face respirator with particulate cartridge. All openings in garments were taped closed. A portable air sampler was set up to record any air-borne contamination inside the tent. Besides the air sampler, a continuous air monitor (CAM) was used and set to alarm if airborne concentrations reached 30 counts per minute (cpm). Extensive surveys of the tent and gloveboxes were performed prior to removal to the hallway. Decontamination personnel were sent in to clean any areas above 20 disintegrations per minute (dpm). The hottest spots were around the spool area of the gloveboxes and the plate on the trolley line.

Future Work

We are continuing with our plans to remove and replace several other gloveboxes, furnaces, and other equipment in the ^{238}Pu processing laboratories, with activities currently scheduled through FY02. Future areas of focus include the use and refinement of containment devices. With this work, we expect to remain a viable resource for DOE in its continuing mission to provide safe and reliable thermal and electrical power for space missions.